

Listing of the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended): A method of processing a wafer having a process side and a back side, comprising:

removing un-wanted particles from the back side of the wafer without effecting the process side of the wafer in order to maintain the desired relationship between the backside of the wafer and a chucking surface;

placing the wafer on a chucking surface after removing the unwanted particles from the back side of the wafer;

etching the process side of the wafer after placing the wafer on the chucking surface and without performing any intervening processing steps between the etching and removal steps.

2. (Cancelled)

3. (Cancelled)

4. (Currently Amended): The method as recited in claim 1 wherein the un-wanted particles are removed by cleaning the backside of the wafer in a dry cleaning process, semi-dry cleaning process or a wet cleaning process, ~~and wherein the specific processing task is selected from etching, deposition or patterning.~~

5. (Previously Amended): A method of processing a wafer having a process side and a backside opposite the process side, the method comprising:

providing a semi-dry cleaning module for cleaning the backside of the wafer and a processing module for performing a processing task on the process side of the wafer;

receiving the wafer for processing;

performing a processing sequence consisting of,

loading the wafer into the cleaning module;

cleaning the backside of the wafer in the semi-dry cleaning module to remove particles therefrom, wherein only the backside of the wafer is cleaned in the semi dry cleaning module so as not to damage the process side of the wafer;

transferring the wafer to the processing module;

loading the wafer into the processing module; and
etching the process side of the wafer in the processing module while the wafer is
inside the processing module.

6. (Original): The method as recite in claim 5 wherein the wafer is a raw wafer or a
previously process wafer.

7. (Cancelled)

8. (Cancelled)

9. (Previously Amended): The method as recited in claim 5 wherein cleaning the backside
of the wafer in the semi-dry cleaning module comprises:

providing a brush for scrubbing the backside of the wafer and an applicator for delivering
a cleaning solution to the backside of the wafer;

positioning the brush against the backside of the wafer;

flowing the cleaning solution between the backside of the wafer and the brush; and

moving the brush relative to the wafer so as to force particles off the backside of the
wafer.

10. (Original): The method as recited in claim 9 wherein the cleaning solution is an alcohol
based solution or a water based solution, and wherein the abrasiveness of the brush is configured
to remove un-wanted particles without altering the backside of the wafer.

11. (Original): The method as recited in claim 5 wherein loading the wafer into the
processing module comprises:

introducing the wafer into a process chamber of the processing module;

placing the wafer on a chuck disposed in the process chamber; and

holding the backside of the wafer relative to a top surface of the chuck,

wherein the unwanted particles are removed from the backside of the wafer to prevent
gaps from forming between the backside of the wafer and the top surface of the chuck.

12. (Original): The method as recited in claim 11 wherein the wafer is held by an
electrostatic force, a vacuum force, or a mechanical force.

13. (Original): The method as recited in claim 11 wherein performing the processing task in the processing module comprises:

- providing a heat transfer system inside the chuck; and
- distributing a heat transfer gas to the backside of the wafer via the heat transfer system, wherein the unwanted particles are removed from the backside of the wafer to reduce heat transfer gas backside faults caused by gaps formed between the backside of the wafer and the top surface of the chuck.

14. (Original): The method as recited in claim 5 wherein the processing task is selected from etching, deposition or patterning.

15. (Original): The method of claim 5 wherein the processing module is a plasma reactor.

16. (Original): The method as recited in claim 5 further comprising:

- providing a multiple cluster tool having a transport module, a load lock for holding a plurality of incoming and outgoing wafers, and an aligner for aligning the wafer, the transport module being arranged for transferring the wafer between the load lock, the aligner, the processing module and the cleaning module;

- loading a plurality of wafers into the load lock before loading the wafer into the cleaning module;

- transferring the wafer to the cleaning module;

- transferring the wafer to the aligner after cleaning the backside of the wafer in the cleaning module and before transferring the wafer to the processing module;

- loading the wafer into the aligner; and

- aligning the wafer in the aligner.

17. (Original): The method as recited in claim 5 further comprising:

- providing an aligner for aligning the wafer inside the cleaning module;

- providing a multiple cluster tool having a transport module and a load lock for holding a plurality of incoming and outgoing wafers, the transport module being arranged for transferring the wafer between the load lock, the processing module and the cleaning module;

- loading a plurality of wafers into the load lock before loading the wafer into the cleaning module;

transferring the wafer to the cleaning module;
aligning the wafer in the cleaning module after the backside of the wafer is cleaned in the cleaning module.

18. (Original): The method as recited in claim 5 further comprising:

providing a multiple cluster tool having a transport module, a load lock for holding a plurality of incoming and outgoing wafers, and an aligner for aligning the wafer, the transport module being arranged for transferring the wafer between the load lock, the aligner, and the processing module;

transferring the plurality of wafers to the load lock after the backside of each of the wafers is cleaned in the cleaning module;

loading the plurality of wafers into the load lock;

transferring the wafer to the aligner before transferring the wafer to the processing module;

loading the wafer into the aligner; and

aligning the wafer in the aligner.

19. Cancelled.

20. Cancelled.

21. (Currently Amended): A method of processing a wafer having a process side and a backside opposite the process side, the method comprising:

providing a cleaning module for cleaning the backside of the wafer and a plasma reactor for performing an etching task on the process side of the wafer, the plasma reactor having a process chamber within which a plasma is formed for the ~~processing~~ etching task and a chuck for supporting the wafer during the ~~processing~~ etching task, the chuck being disposed inside the process chamber, the chuck including a heat transfer system;

receiving the wafer for a specific etching task, the specific etching task being the next processing task in a sequence of processing tasks which include other etching tasks, deposition tasks or patterning tasks;

cleaning the backside of the wafer in the cleaning module to remove particles therefrom before performing the specific processing task, wherein only the backside is cleaned so as not to damage the process side of the wafer;

removing the wafer from the cleaning module and thereafter introducing the wafer into the process chamber of the plasma reactor before performing any other processing tasks in the sequence of processing tasks ~~without performing any intervening processing steps therebetween;~~

placing the wafer on the chuck; and

holding the backside of the wafer relative to a top surface of the chuck with an electrostatic force, the cleaned backside of the wafer preventing undesirable gaps from forming between the backside of the wafer and the top surface of the chuck;

performing the etching task with the plasma on the process side of the wafer in the process chamber of the plasma reactor; and

distributing a heat transfer gas to the backside of the wafer via the heat transfer system during the etching task, the cleaned backside of the wafer reducing heat transfer gas faults caused by undesirable gaps.

22. (Previously Added): The method as recited in claim 21 wherein the wafer is cleaned with a dry cleaning process.

23. (Previously Added): The method as recited in claim 21 wherein the wafer is cleaned with a semi-dry cleaning process.

24. (Previously Added): The method as recited in claim 21 wherein the wafer is cleaned with a wet cleaning process.

25. (Currently Amended): A method of processing a wafer having a process side and a back side, comprising:

receiving a wafer for processing;

performing a processing sequence consisting of,

only removing un-wanted particles from the back side of the wafer;

placing the wafer on a chucking surface after removing the unwanted particles from the back side of the wafer, wherein removing un-wanted particles from the backside of the wafer maintains the desired relationship between the backside of the wafer and the chucking surface;

etching the process side of the wafer while the wafer is held on the chucking surface.

26. (New) A process method for processing a wafer having a process side and a back side opposite the process side, the process method consisting essentially of:

receiving a wafer for a specific processing task, the specific processing task being the next processing task in a sequence of processing tasks;

performing a cleaning task before performing the specific processing task, the cleaning task including cleaning the backside of the wafer without cleaning the front side of the wafer; and

performing the specific processing task after performing the cleaning task.

27. (New) The method as recited in claim 26 wherein the specific processing task corresponds to an etching task or deposition task, and wherein the sequence of the processing tasks includes one or more etching tasks, deposition tasks or patterning tasks.

28. (New) The method as recited in claim 26 wherein the wafer is transferred from a cleaning area to a process area between the cleaning and specific processing task.

29. (New) The method as recited in claim 26 wherein the specific processing task is completed in its entirety while the wafer is held on a chucking surface.

30. (New): The method as recited in claim 29 wherein the cleaning task is configured to remove unwanted particles from the back side of the wafer in order to maintain the desired relationship between the backside of the wafer and the chucking surface during the specific processing task.

31. (New): The method as recited in claim 26 wherein the cleaning task includes a dry cleaning process, a semi-dry cleaning process, or a wet cleaning process.

32. (New) The method as recite in claim 26 wherein the wafer is a raw wafer or a previously processed wafer.

33. (New) The method as recited in claim 32 wherein the process side of the wafer includes dielectric layers, conductive layers or masking layers.

34. (New) The method as recited in claim 26 wherein the cleaning task comprises positioning a brush against the back side of the wafer; moving the brush relative to the backside of the wafer or moving the brush relative to the wafer; and flowing a cleaning solution between the backside of the wafer and the brush during movement of either the brush or the wafer.
35. (New) The method as recited in claim 26 wherein the specific processing task comprises: supplying a gas containing etchant or deposition source gases and applying energy to the source gases to etch or deposit a layer of material on the process side of the wafer.
36. (New) The method as recited in claim 21 wherein the etching task is stopped and a flow error procedure is performed when gas faults occur during the distribution of the heat transfer gases, the flow error procedure including restarting the etching task in the first process chamber, performing the etching task in a second process chamber, or cleaning the backside of the wafer in the cleaning module and thereafter performing the etching task in the first or second process chamber.
37. (New) The method as recited in claim 21 wherein no intervening processing steps are performed between removing the wafer from the cleaning module and introducing the wafer into the process chamber of the plasma reactor.
38. (New) The method as recited in claim 1 wherein the intervening processing steps correspond to etching, deposition or patterning steps.
39. (New) The method as recited in claim 1 wherein the step of placing the wafer on a chucking surface occurs immediately after the removing step.